CLAIMS:

1. An optical scanning device for scanning a first information layer by means of a first radiation beam in a first operating mode and a second information layer by means of a second radiation beam in a second operating mode, the device comprising:

- a radiation source for emitting said first and second radiation beams consecutively or simultaneously,

- an objective lens system for converging said first and second radiation beams on the positions of said first and second information layers, respectively, and

- a phase structure arranged in the optical path of said first and second radiation beams, the structure having an optical axis and including a central part (P_1) and at least one marginal part (P_2) for forming a non-periodic stepped profile in the radial direction, characterized in that one (P_2) of said central and marginal parts (P_1, P_2) is divided into at least a first angular segment ($AS_{2,1}$) and a second angular segment ($AS_{2,2}$) having a first step height ($h_{2,1}$) and a second, different step height ($h_{2,2}$), respectively, for introducing in said first operating mode a first wavefront modification $\Delta W_{2,1,1}$ and a second wavefront modification $\Delta W_{2,2,1}$, respectively, and in said second operating mode a third wavefront modification $\Delta W_{2,1,2}$ and a fourth wavefront modification $\Delta W_{2,2,2}$, respectively, where the difference $(\Delta W_{2,1,2}+\Delta W_{2,2,2})-(\Delta W_{2,1,1}+\Delta W_{2,2,1})$ is asymmetric in respect of said optical axis (19).

2. An optical scanning device according to claim 1, wherein $(\Delta W_{2,1,2}+\Delta W_{2,2,2})-(\Delta W_{2,1,1}+\Delta W_{2,2,1})$ is of the type of astigmatism, tilt, coma or clover.

3. An optical scanning device according to claim 1, wherein either the resulting wavefront modification $\Delta W_{2,1,1}+\Delta W_{2,2,1}$ in the first mode or the resulting wavefront modification $\Delta W_{2,1,2}+\Delta W_{2,2,2}$ in the second mode is substantially flat.

4. An optical scanning device according to claim 1, wherein said phase structure includes birefringent material sensitive to a first polarization (p_1) of said first radiation beam

in said first mode and to a second, different polarization (p_2) of said second radiation beam in said second mode.

5. An optical scanning device according to claim 1, further including a cover layer arranged such that said phase structure forms a plate.

6. An optical scanning device according to claim 1, wherein said heights are designed such that the relative step heights ($h_{m,j+1}$-$h_{m,j}$; $h_{m+1,j}$-$h_{m,j}$) between adjacent steps ($AS_{m,j+1}$, $AS_{m,j}$; $AS_{m+1,j}$, $AS_{m,j}$) include a relative step height having an optical path substantially equal to $a\lambda_1$, wherein "a" is an integer and a>1 and "λ_1" is the wavelength of said first radiation beam.

7. An optical scanning device according to claim 1, wherein said phase structure is generally circular and said steps are generally annular.

8. An optical scanning device according to claim 1, wherein said phase structure is formed on a face of a lens of said objective lens system.

9. An optical scanning device according to claim 1, wherein said phase structure is formed on an optical plate provided between said radiation source and said objective lens system.

10 An optical scanning device according to claim 9, wherein said optical plate comprises a quarter wavelength plate or a beam splitter.

11. A phase structure operating in a first mode and in a second mode, the structure having an optical axis and including a central part (P_1) and at least one marginal part (P_2) for forming a non-periodic stepped profile in the radial direction, characterized in that one (P_2) of said central and marginal parts (P_1, P_2) includes at least a first segment ($AS_{2,1}$) and a second segment ($AS_{2,2}$) having a first step height ($h_{2,1}$) and a second, different step height ($h_{2,2}$), respectively, for introducing in said first operating mode a first wavefront modification $\Delta W_{2,1,1}$ and a second wavefront modification $\Delta W_{2,2,1}$, respectively, and in said second operating mode a third wavefront modification $\Delta W_{2,1,2}$ and a fourth wavefront modification

$\Delta W_{2,2,2}$, respectively, where the difference $(\Delta W_{2,1,2}+\Delta W_{2,2,2})-(\Delta W_{2,1,1}+\Delta W_{2,2,1})$ is asymmetric.

12. A lens for use in an optical scanning device for scanning a first information layer by means of a first radiation beam in a first operating mode and a second information layer by means of a second radiation beam in a second operating mode, the lens being provided with a phase structure according to claim 11.